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**Consumption Taxes and International
Competitiveness in a Keynesian World**

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Abstract

The present paper analyzes the consequences of a consumption tax reform for the export sector. In particular, it offers an explanation why exporters support such a reform although economic theory basically predicts trade neutrality. To this purpose, the basic neoclassical model is replaced with two Keynesian assumptions, i.e. sticky wages and absence of perfect foresight. It is derived that in both cases the export sector expands in the short run. However, with sticky wages, this is only possible if, at the same time, the central bank fixes the exchange rate. In the absence of perfect foresight, on the other hand, the additional condition for the tax reform to increase exports is that the government balances its budget in each period.

Keywords: Consumption tax reform, international competitiveness, Keynesian assumptions

JEL Classification: D50, F10, H22

1 Introduction

There is a widespread belief among businessmen and politicians that a reform from an income to a consumption tax improves the international competitiveness of an open economy¹. It is argued that because such a reform exempts the export industry from paying taxes, exported commodities can be sold at lower prices and, therefore, export demand increases. In line with this argument, exporters favor a tax reform towards consumption taxes such as a VAT of the destination principle, since with the destination principle the tax is levied on imports but rebated on exports.

Following a mercantile position, governments often support this argumentation and thus prefer consumption to income taxes. To cite an example, in its newly published statement on fiscal policy, the Swiss government recommends shifting taxation from direct income taxes to indirect consumption taxes. The explanation for this recommendation is the negative effect of high income taxes on international competitiveness².

The popular belief about the advantages of consumption taxes with respect to international competitiveness stands in sharp contrast to the theory of public finance. The basic equivalence of labor income and consumption taxes is presented in many public finance textbooks and surveys (see, for example, Atkinson and Stiglitz as well as Richter and Wiegard for closed economies and, particularly, Frenkel and Razin for open economies). The basic idea of the equivalence is that both consumption and income - as well as value added - represent the same tax base from another perspective, i. e. from the expenditure, distribution and production side respectively. But if the same base is taxed at the corresponding rates, the different approaches cannot have different economic consequences. The equivalence also holds in an intertemporal model with savings as long as the present values of the tax bases are the same. This is the case with labor income and consumption but not with an income tax base that includes capital income. As is well known, the taxation of capital income discriminates against future consumption and hence causes disincentives to save. However, since the focus of this paper is not on the distortion of the savings decision, capital income taxation is excluded in the following analysis.

When we look at the different opinions of the public and academics on the consequences of consumption taxes on international competitiveness, the question arises why such a discrepancy exists. One answer to this question is that economic theory and particularly

¹¹ Although it can be questioned whether the concept of competitiveness can be applied to national economies at all (see, for example, Krugmann (1996)), we use the term as it is usually understood in trade discussion, i.e. the ability to export.

general equilibrium adjustments are not fully understood by businessmen and politicians. In this case, the challenge to the economic profession is to better communicate the economic knowledge to the public.

Another explanation is that the basic economic models rendering equivalence between income and consumption taxes are not sufficiently structured to fully describe the consequences of a consumption tax reform on international trade. Thus, it is necessary to analyze models with more structure in order to control the stability of the equivalence result.

Grossman, in his extension of the basic model, allows for trade in intermediate goods and concludes that the introduction of consumption taxes is trade neutral as long as the destination principle is applied.

Krugman and Feldstein take into account that, in practice, value added taxes frequently exempt housing and personal services which are typically nontradable commodities. However, they conclude that with such a tax system, consumption of imports and, as a consequence, exports decline.

Frenkel and Razin, on the other hand, emphasize the effects on intertemporal optimization when the government balances its budget in each period. With an initial trade surplus, consumption tax rates must be set higher in the first period than in the second which gives rise to a substitution of present for future consumption. In a model with exogenous labor supply and all savings made abroad, such an increase in savings in the first period increases exports simultaneously.

Both Krugman and Feldstein as well as Frenkel and Razin derive their results with a neoclassical model comprising flexible prices and perfect foresight. In contrast to that, the goal of the present paper is to analyze the effects of a consumption tax reform on international trade with a model that includes Keynesian aspects, i.e. sticky wages and consumption depending on current income only. Obviously, with such a model, the equivalence between income and consumption taxes no longer holds and the question arises under which conditions exports increase with a consumption tax reform.

It will be derived that with sticky wages, exports can only increase if the central bank is willing to finance the additional foreign demand. On the other hand, with consumption as a function of current income, the effects on exports are, in line with Frenkel and Razin, dependent on the initial trade position as well as the government's choice to balance the

² Finanzzeitbild, p. 20

budget intertemporally or period by period. Starting with a trade surplus, a tax reform with a balanced budget in each period increases private savings and exports in the first period.

The remainder of this paper is structured as follows: Section 2 presents the general model in levels and in relative changes around an initial equilibrium. This model is then used to analyze the special assumptions of fixed prices and no perfect foresight separately. Section 3 derives and discusses the results of a consumption tax reform when wages are sticky. Section 4 calculates the reduced forms when a Keynesian consumption function is applied and compares the results with a model of perfect foresight. Section 5 concludes.

2 The Model

The model describes an open economy with labor as the only production factor and three goods, i.e. a nontradable, an export and an import commodity. To keep the model simple, the exported commodity is not consumed and the imported good is not produced domestically. Since we first do not apply intertemporal optimization, only one period is modeled. Table 1 gives a mathematical description of the model in levels.

Production:

The production functions of the domestic (Y) and the export (X) sector are described in (I.1) and (I.2) respectively. We assume constant returns to scale for both sectors. The implicit demand functions (I.3) follow from profit maximization. The non-profit conditions (I.4) guarantees that the assumption of perfect competition holds. The producer price of labor (I.5) includes a quantity tax rate.

Household:

The representative domestic household supplies a given amount of labor (I.12) and consumes the nontradable (Y) and an import (Q) good (I.6). The budget constraint (I.7) follows from a Keynesian consumption function which describes that a constant share of nominal income is consumed. A quantity tax on the two consumption goods determines the consumer prices (I.8).

International trade:

The demand for the exported commodity (I.9) depends on the relative commodity price. This implies a rather specialized export commodity since its price is not given by the world market.

Such an assumption is plausible for small but highly developed countries that sell differentiated products such as automobiles or machinery³. On the other hand, the import good is traded at a given world market price. Hence, the small country assumption holds on the import but not on the export side and therefore, terms of trade can vary.

The trade balance (I.10) allows for foreign capital accumulation by private households as well as intervention by the central bank (R). Without loss of generality, we set central bank intervention equal to zero in the benchmark.

Table 1: The model in levels

<i>Production:</i>		
Production-function domestic sector	$Y = Y(L_Y)$	(I.1)
Production-function export sector	$X = X(L_X)$	(I.2)
First order conditions	$P_Y \frac{\partial Y}{\partial L_Y} = P_X \frac{\partial X}{\partial L_X} = P_l^p$	(I.3)
Non-profit conditions	$P_Y Y = P_l^p L_Y; P_X X = P_l^p L_X$	(I.4)
Producer price of labor	$P_l^p = P_l + t_l$	(I.5)
<i>Household:</i>		
Utility function	$U = U(Y, Q)$	(I.6)
Budget constraint	$c P_l \bar{L} = P_Y^h Y + P_Q^h Q$	(I.7)
Consumer prices	$P_Y^h = P_Y + t_h; P_Q^h = \bar{P}_Q + t_h$	(I.8)
<i>International trade:</i>		
Exported good demand	$X = X(P_X / \bar{P}_Q)$	(I.9)
Trade balance	$P_X X = \bar{P}_Q Q + (1 - c) P_l \bar{L} + R$	(I.10)
Government budget	$t_l \bar{L} + t_h (Y + Q) = 0$	(I.11)
Labor market	$L_Y + L_X = \bar{L}$	(I.12)

Notation:

Y :	domestic commodity	\bar{P}_Q :	price of imported commodity
X :	exported commodity	P_l :	after-tax wage rate
Q :	imported commodity	t_h :	consumption tax rate
L_Y, L_X :	labor input in sectors	t_l :	labor tax rate
P_Y, P_X :	producer price of commodities	\bar{L} :	total labor supply
P_l^p :	producer price of labor	c :	consumption share
P_Y^h, P_Q^h :	consumer prices	R :	change of central bank reserves

³ See, for example Dervis, De Melo and Robinson (1982), p.225.

Government:

To simplify the model, all tax rates in the benchmark are set to zero. The government, therefore, does not supply public goods (see I.11)⁴ and, in the counterfactuals, only transfers consumption tax revenue to labor. Thus, the tax reform describes an introduction of taxes and subsidies rather than an increase and corresponding decrease in existing taxes.

In order to derive the reduced forms for a marginal increase in consumption taxes, the model is log-linearized⁵. Table 2 presents the model in relative changes (denoted by a tilde except when indicated otherwise) around an initial equilibrium. To further simplify the analysis, quantities are normalized such that all prices are unity in the benchmark⁶.

Table 2: The model in relative changes

<i>Production:</i>		
Output	$\tilde{Y} = \tilde{L}_Y; \quad \tilde{X} = \tilde{L}_X$	(II.1)
Non-profit conditions	$\tilde{P}_Y = \tilde{P}_X = \tilde{P}_l^p$	(II.2)
Producer price of labor	$\tilde{P}_l^p = \tilde{P}_l + \tilde{t}_l$	(II.3)
<i>Household:</i>		
Commodity demand	$\tilde{Y} - \tilde{Q} = \sigma(\tilde{P}_Q^h - \tilde{P}_Y^h)$	(II.4)
Budget constraint	$\tilde{P}_l = \phi(\tilde{P}_Y^h + \tilde{Y}) + (1 - \phi)(\tilde{P}_Q^h + \tilde{Q})$	(II.5)
Consumer prices	$\tilde{P}_Y^h = \tilde{P}_Y + \tilde{t}_h; \quad \tilde{P}_Q^h = \tilde{t}_h$	(II.6)
<i>International trade:</i>		
Exported good demand	$\tilde{X} = \varepsilon \tilde{P}_X$	(II.7)
Trade balance	$\tilde{P}_X + \tilde{X} = \psi \tilde{Q} + (1 - \psi) \tilde{P}_l + \tilde{R}$	(II.8)
Government budget	$\tilde{t}_l + c \tilde{t}_h = 0$	(II.9)
Labor market	$\gamma \tilde{L}_Y + (1 - \gamma) \tilde{L}_X = 0$	(II.10)

Notation:

Parameters:

σ : substitution elasticity between commodities in consumption

ε : price elasticity of exported good demand

Shares:

$$\phi \equiv \frac{Y}{Y + Q}; \quad \psi \equiv \frac{Q}{X} = \psi(c, \phi); \quad \gamma \equiv \frac{L_Y}{L} = c\phi$$

Taxes:

$$\tilde{t}_h \equiv dt_h; \quad \tilde{t}_l \equiv d\tilde{t}_l$$

Reserves (R in benchmark = 0):

$$\tilde{R} \equiv \frac{dR}{P_X X}$$

⁴ Given the assumption of an exogenous labor supply, such a formulation is equivalent to a benchmark with existing labor taxes financing a fixed amount of a public good which is weakly separable from private goods.

⁵ Log-linearization is achieved by linearizing the logarithmic model using a Taylor expansion around an initial equilibrium, and eliminating all non-linear terms. Therefore, the results apply to marginal changes only. For a detailed derivation of the relative changes in a similar model, see Schleiniger and Felder, Appendix A.

⁶ With such a formulation, there is no difference between quantity and ad valorem tax rates. Also the shares as presented in table 2 can be expressed in quantities alone.

3 Fixed wage rate

A typical feature of Keynesian models is a nominally fixed wage rate. However, the general equilibrium is determined in relative prices only. Therefore, fixing one price alone places no restriction on the model but is a matter of normalization⁷.

Note however, that the model presented above is already normalized around the import price. Hence, additionally fixing the wage rate keeps the price of labor relative to the import good constant. In practice, such a situation results if the import price in foreign currency, the nominal exchange rate and the wage rate all remain constant. A fixed exchange rate must be supported by the central bank though, and therefore, reserves in (I.19) and (II.8) respectively become endogenous.

To calculate the reduced forms of a consumption tax reform when the after-tax wage rate is fixed relative to the import price, we exclude private savings and consequently set the consumption share in tables 1 and 2 equal to one. Table 3 presents the results of this tax reform with respect to the producer price of labor, the exported and imported good as well as the nontradable⁸.

Table 3: Reduced forms with a fixed wage rate

\tilde{P}_l^p	$-\tilde{t}_h$
\tilde{X}	$-\varepsilon\tilde{t}_h > 0$
\tilde{Y}	$[-(1-\phi) + \sigma(1-\phi)]\tilde{t}_h < 0$
\tilde{Q}	$[-(1-\phi) - \sigma\phi]\tilde{t}_h < 0$

With a reform that levies a consumption tax and uses the revenue to cut labor taxes, which in our case corresponds to a labor subsidy, the producer price of labor decreases. Cheaper labor, on the other hand, allows the export industry to offer their product at a lower price and, since the exchange rate remains constant, export demand increases according to the respective price elasticity. Note that with a flexible exchange rate and nominally fixed wages, the exchange

⁷ For a discussion of normalization in an open economy, see Dervis, De Melo and Robinson pp. 192-194.

⁸ With a fixed wage rate, the model becomes recursive and, therefore, the derivation of reduced forms is straightforward.

rate will adjust such that the export price in foreign currency remains unchanged, as will export demand.

With given labor supply and increased export production, the output of the nontradable falls. Table 3 explains the change in the domestic product from the demand side. The first term $(-(1-\phi))$ in the reduced form for \tilde{Y} represents a negative income effect due to a higher import price, and the second term $(+\sigma(1-\phi))$ describes the substitution of the nontradable for the import commodity. The import demand (\tilde{Q}) must decrease even more than the demand for domestic production since both the income and substitution effect $(-\sigma\phi)$ are negative.

With a fixed price of labor relative to the import good, the central banks change in reserves is endogenous. While the value of import decreases since the imported quantity decreases at a given price, the value of export increases with elastic demand and decreases with inelastic demand. Equation (1) shows that the consumption tax reform yields a balance of payment surplus, provided export demand is elastic. Such a surplus must be financed by the central bank, which leads to an increase in foreign currency reserves.

$$\tilde{R} = [- (1 + \varepsilon) + (1 - \phi) + \sigma\phi] \tilde{t}_h \quad (1)$$

A consumption tax reform with a fixed wage rate relative to imports, thus favors the export sector at the cost of a lower real wage and decreasing terms of trade. However, such an export expansion is only possible as long as the central bank is willing to finance the additional export demand and thereby support the foreign currency.

4 Keynesian consumption function

In order to analyze the effects of the tax reform when the household consumes according to a Keynesian consumption function, we allow prices to vary again. Therefore, the central bank does not need to intervene and reserves in (I.19) and (II.8) are set to zero. On the other hand, we now introduce private savings and accordingly, set the consumption share c in (I.6) to smaller than one. Expenditure, then, is proportional to nominal income and, since labor supply is given, also proportional to the nominal wage rate (see also II.5). Note again that, since with such a formulation future income does not influence present consumption, only the present period is considered and no intertemporal optimization needs to be applied⁹.

⁹ Of course, the plausibility of such a consumption function can be discussed at length (see, for example, Stanley for a critical empirical discussion on the validity of Riccardian equivalence). However, such a discussion is not the scope of this paper.

We further assume the government to balance its budget in the given period and not to take into account future tax flows. With positive private savings, this implies a labor subsidy rate which is smaller than the tax rate on consumption (see II.9).

Table 4 presents the reduced forms when a marginal consumption tax is introduced. The derivation of these results is explained in appendix A.

Table 4: Reduced forms with a Keynesian consumption function

\tilde{P}_l^p	$\frac{\gamma(1-c)}{\gamma(1-\phi)(1-\sigma) + (1-\gamma)\varepsilon} \tilde{t}_h \equiv \Delta \tilde{t}_h < 0$
\tilde{X}	$\varepsilon \Delta \tilde{t}_h > 0$
\tilde{Y}	$-\frac{(1-\gamma)\varepsilon}{\gamma} \Delta \tilde{t}_h < 0$
\tilde{Q}	$\left[-\frac{(1-\gamma)\varepsilon}{\gamma} + \sigma \right] \Delta \tilde{t}_h < 0$

The results in table 4 are driven by the fact that, with a Keynesian consumption function, a share of the redistributed consumption tax is saved by the household. Hence, total consumption decreases. The decrease in consumption demand leads producers to lower labor demand, which, in turn, reduces the producer price of labor¹⁰. The reduction in the producer price of labor depends on the consumption share. The more the household saves from the redistributed revenue, the stronger the effect on labor demand and price is.

In fact, this adjustment process is an application of the Haavelmo-theorem, which is also based on the assumption that additional income taxes are partly financed out of private savings, or vice versa, that a fraction of additional disposable income due to tax cuts is saved. With the producer price of labor falling, the price of the export good also decreases and international competitiveness rises, i.e. the export sector expands. Since, with this expansion, labor input is shifted from the domestic to the export sector, domestic production must decrease. The reduction in import demand (see \tilde{Q} in table 4), on the other hand, can be

¹⁰ The denominator in the reduced form of the producer price of labor in table 4 describes the own price effect which, for stability reasons, must be negative.

explained by a decrease in total consumption and a substitution of nontradables for imports¹¹. The substitution effect occurs because the consumer price of domestic production falls relative to imports, which, in turn, is explained by the fact that the lower producer price of labor influences nontradables only.

Of course, with negative savings and hence, with a trade balance deficit, all the signs in table 4 would be reversed. The sensitivity of a consumption tax reform on the initial trade position has already been stressed by Frankel and Razin. However, in Frankel and Razin, the household adjusts to a different anticipated time path of tax rates while in the present model, it is the change in present nominal income that induces a different behavior.

The next subsection extends the analysis by considering intertemporal aspects and compares the Keynesian assumptions with a model of perfect foresight.

4.1 Intertemporal extension

In order to discuss the dynamic consequences of the tax reform, the model is extended to include a second period in which the household consumes the savings of the first period. Since, with a Keynesian consumption function, the tax reform increases savings in the first period, consumption in the second period must rise¹². If there is still domestic production in the second period, i.e. a domestic labor supply, the rise in consumption increases labor demand and, as a consequence, the producer price of labor. In this case, exports would become more expensive and export demand would fall¹³.

If, on the other hand, the household anticipates all future tax flows with perfect foresight, he realizes that the tax reform does not change his intertemporal budget constraint. In particular, the household anticipates the full redistribution of future consumption taxes and, if there is labor supply in the second period, the future nominal income to increase according to (II.9). Since the consumption share in the second period is larger than one, the labor subsidy rate is now bigger than the consumption tax rate.

¹¹ Note that the results for \tilde{Y} and \tilde{Q} in table 4 are not expressed as the sum of an income and substitution effect but conditional on labor input in the domestic sector.

¹² Note that the consumption share in the second period is endogenous.

¹³ If there is no labor supply in the second period, then there is no domestic production and no export either. In this case, exports obviously cannot change.

In order to prove that the tax reform does not alter the intertemporal budget constraint, we first formulate the constraint with taxes in equation(2).

$$(1 - t_{l1})\bar{L}_1 + \frac{(1 - t_{l2})P_{l2}^p \bar{L}_2}{1 + r} = (1 + t_h) \left(C_1 + \frac{P_{C2} C_2}{1 + r} \right) \quad (2)$$

with:

r : discount rate

C_i : overall consumption in period $i=1,2$

\bar{L}_i : given labor supply in period $i=1,2$

P_{l2}^p : producer price of labor in second period

P_{C2} : price of composite consumption bundle in second period

t_{li} : labor tax rate in period $i=1,2$

Next, the labor tax rates are derived from the requirement of a balanced government budget in each period:

$$t_{l1} = -t_h \frac{C_1}{\bar{L}_1} \text{ and } t_{l2} = -t_h \frac{P_{C2} C_2}{P_{l2} \bar{L}_2} \quad (3)$$

Substitution of the labor tax rates into equation (2) then yields:

$$\left(1 + t_h \frac{C_1}{\bar{L}_1} \right) \bar{L}_1 + \frac{\left(1 + t_h \frac{P_{C2} C_2}{P_{l2} \bar{L}_2} \right) P_{l2} \bar{L}_2}{1 + r} = (1 + t_h) \left(C_1 + \frac{P_{C2} C_2}{1 + r} \right) \quad (4)$$

and respectively:

$$\bar{L}_1 + \frac{P_{l2} \bar{L}_2}{1 + r} = C_1 + \frac{P_{C2} C_2}{1 + r} \quad (5)$$

Equation (5), finally, coincides with the intertemporal budget constraint without taxes.

Because the household with perfect foresight realizes that the tax reform does not change his intertemporal budget restriction, he will not change his consumption pattern either, and therefore, the consumption tax is equivalent to the taxation of labor¹⁵. To maintain his consumption pattern, the household spends the full amount of the redistributed tax revenue in each period. Savings, in this case, are not a constant fraction of nominal income as in the Keynesian case, but a constant absolute amount¹⁶.

¹⁴ Since there are no taxes in the benchmark, the tax changes in the reform scenario can be formulated in absolute values.

¹⁵ Note that this equivalence only holds with exogenous labor supply in each period. Frenkel and Razin show that, with endogenous labor supply, the differentiated labor tax changes the path of the after-tax wage rate and therefore causes an intertemporal substitution of labor supply. The same effect is described by Trostel (1993) with a tax reform that substitutes labor income for lump-sum taxes.

¹⁶ If we set the budget constraint of (I.7) in table 1 according to $P_l \bar{L} - \bar{S} = P_Y^h Y + P_Q^h Q$, (II.5) in table 2

changes to $\frac{1}{c} \tilde{P}_l = \phi (\tilde{P}_Y^h + \tilde{Y}) + (1 - \phi) (\tilde{P}_Q^h + \tilde{Q})$. The derivation of the reduced forms along the lines of

A further possibility in a two period model is that not the household but the government anticipates future tax flows. Since the present value of labor and consumption must be equal, the government can balance its budget intertemporally by setting a flat tax on consumption and labor such that $\tilde{t}_l = -\tilde{t}_h$. With such a flat tax system and private savings in the first period, the government runs a deficit in the first period which is balanced again in the second period. With such a flat tax system, the equivalence between the labor and consumption tax is sustained even with a Keynesian consumption behavior of the household.

To explain the equivalence when the government applies flat taxes, we can look at the producer price of labor (equation 6) and the budget constraint in the case of a Keynesian consumer behavior (equation 7) – in the first period:

$$\tilde{P}_l^p = \tilde{P}_l - \tilde{t}_h \quad (6)$$

$$\tilde{P}_l^p + \tilde{t}_h = \phi(\tilde{P}_l^p + \tilde{t}_h + \tilde{L}_y) + (1 - \phi)(\tilde{t}_h + \tilde{Q}) = \phi(\tilde{P}_l^p + \tilde{L}_y) + (1 - \phi)\tilde{Q} + \tilde{t}_h. \quad (7)$$

From equation (7), it can be seen that, in this case, the higher nominal income due to the labor subsidy exactly offsets the higher commodity prices. Thus, since neither the real income nor the relative commodity prices changes, consumption remains unchanged and the two tax schemes must be equivalent.

5 Conclusions

The present paper analyzes the effects of a consumption tax reform on international trade. In particular, it tries to explain why such a reform is supported by the export sector although public finance theory has long recognized the basic equivalence between labor income and consumption taxes. To that end, the neoclassical model with flexible prices and perfect foresight is replaced by the Keynesian assumptions of sticky wages and consumption dependent on present income only. Then, the conditions are derived under which a consumption tax reform expands exports.

Since the general equilibrium in the applied model is only defined in relative prices, fixing the wage rate alone does not restrict the solution of the model. If, on the other hand, the wage rate is fixed relative to the import price, the price adjustment is restricted. In this case a consumption tax reform decreases the producer price of labor and the relative price of exports. As a consequence, exports expand. However, this result is only feasible if the central bank is willing to support the foreign currency by financing the additional export. Both conditions, a

appendix 1 proves that, in this case, relative prices are not changed by the tax reform and therefore the equivalence persists.

fixed after-tax wage rate and a fixed exchange rate are plausible in the short run, In the long run, however, price flexibility yields equivalence again.

In a model with savings and consumption as a constant share of present income, the export sector expands in the first period, provided the government balances its budget in each period. Since the household saves a fraction of the redistributed consumption tax yield, overall consumption decreases. As a consequence, labor demand shifts downwards and the producer price of labor falls, which enables the export sector to sell its product at a lower price. The expansion of the export sector is possible because the real wage and terms of trade in the first period decrease.

In the second period, however, the signs of the adjustment process are inverted. The household consumes more, labor demand shifts upwards, the producer price of labor increases and so does the export price. Thus, with a Keynesian consumption behavior, the consumption tax reform favors the export sector in the first period but not in the second.

We conclude that the inclusion of Keynesian assumptions in a model to analyze the trade effects of a consumption tax reform can yield an expansion of the export sector in the short run. Since the household in a Keynesian model has no perfect foresight, it is consistent to make the same assumption with respect to the producer. Therefore, the short-run expansion of the export sector can explain the political support of exporters for such a tax reform.

Appendix: Derivation of reduced forms

First, we eliminate \tilde{Y} and \tilde{X} using the output equation (II.1):

$$\text{Commodity demand} \quad \tilde{L}_Y - \tilde{Q} = \sigma(\tilde{P}_Q^h - \tilde{P}_Y^h) \quad (\text{A.1})$$

$$\text{Budget constraint} \quad \tilde{P}_l = \phi(\tilde{P}_Y^h + \tilde{L}_Y) + (1 - \phi)(\tilde{P}_Q^h + \tilde{Q}) \quad (\text{A.2})$$

$$\text{Exported good demand} \quad \tilde{L}_X = \varepsilon \tilde{P}_X. \quad (\text{A.3})$$

Next, \tilde{P}_Y and \tilde{P}_X as well as \tilde{t}_l are eliminated using the non-profit conditions (II.2) and the government budget (II.9) respectively:

$$\text{Exported good demand} \quad \tilde{L}_X = \varepsilon \tilde{P}_l^p \quad (\text{A.4})$$

$$\text{Producer price of labor} \quad \tilde{P}_l^p = \tilde{P}_l - c \tilde{t}_h \quad (\text{A.5})$$

$$\text{Consumer prices} \quad \tilde{P}_Y^h = \tilde{P}_l^p + \tilde{t}_h; \quad \tilde{P}_Q^h = \tilde{t}_h. \quad (\text{A.6})$$

Now, the consumer prices (A.6) are substituted into the commodity demand (A.1) and the budget constraint (A.2). At the same time, \tilde{P}_l is eliminated using the equation for the producer price of labor (II.3):

$$\text{Commodity demand} \quad \tilde{L}_Y - \tilde{Q} = \sigma(\tilde{t}_h - \tilde{P}_l^p - \tilde{t}_h) = -\sigma \tilde{P}_l^p \quad (\text{A.7})$$

$$\text{Budget constraint} \quad \tilde{P}_l^p + c \tilde{t}_h = \phi(\tilde{P}_l^p + \tilde{t}_h + \tilde{L}_Y) + (1 - \phi)(\tilde{t}_h + \tilde{Q}). \quad (\text{A.8})$$

In the next step, we solve (A.7) for \tilde{Q} and substitute it into the budget constraint (A.8).

Solving for \tilde{L}_Y , we derive the labor demand in the domestic sector as a function of \tilde{P}_l^p and \tilde{t}_h :

$$\tilde{L}_Y = (1 - \phi)(1 - \sigma) \tilde{P}_l^p - (1 - c) \tilde{t}_h. \quad (\text{A.9})$$

To arrive at the reduced form for the producer price of labor, we substitute labor demand in the domestic (A.9) and export sector (A.4) respectively into the labor market equilibrium (II.10):

$$\tilde{P}_l^p = \frac{0}{\gamma \left[\frac{1}{c} - \phi - (1 - \phi) \sigma \right] + (1 - \gamma) \varepsilon} = 0.$$

Using the definition for γ we arrive at the result in table 4.

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